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# Psychometric Analyses of the Clinician-Administered PTSD Scale (CAPS)—Bosnian Translation

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Methods for assessing psychological distress in culturally diverse populations are not firmly established. This study was designed to examine the psychometric properties of the Bosnian translation of the Clinician-Administered PTSD Scale (CAPS; D. D. Blake, F. W. Weathers, L. M. Nagy, D. Kaloupek, G. Klauminzer, D. Charney, et al., 1995) in a Bosnian refugee sample. The authors interviewed 115 help-seeking Bosnian refugees with the CAPS—Bosnian translation to examine its internal consistency and convergent validity, and to provide an assessment of its factor structure. This study demonstrated optimal fit with a 2-factor model of posttraumatic stress disorder (PTSD); the authors also found high reliability with a coefficient alpha of 0.92 and strong convergent validity with instruments measuring depression, anxiety, and levels of psychosocial functioning. Future directions for the assessment of PTSD in cross-cultural populations are discussed.

*Keywords:* refugee, PTSD, Clinician-Administered PTSD Scale, reliability, validity

The United Nations High Commissioner for Refugees (UNHCR) in their January 2004 report suggests that there are currently 17,084,100 refugees worldwide, with 978,100 living in North America. Recent scientific studies indicate that refugees who arrive in the United States from war-torn countries were often exposed to multiple stressors related to combat, torture, dislocation, resettlement, and acculturation. These events, either individually or in combination, can contribute to the development of psychological disorders, including posttraumatic stress disorder (PTSD; Mollica, Wyshak, & Lavelle, 1987).

The civil war in Bosnia-Herzegovina tragically imposed adversity on local civilian populations residing in this region and resulted in many Bosnians seeking refuge outside of their country. It is estimated that the war caused more than 250,000 deaths, created more than 2 million refugees and internally displaced persons, and wounded 200,000 people in Bosnia-Herzegovina alone (Mollica et al., 1999). Many of these refugees resettled in America; for example, more than 100,000 Bosnian refugees and asylees (asylum seekers) were granted permanent resident status from 1991 to 2004 (Department of Homeland Security, 2004). The Commonwealth of Massachusetts is consistently among the top 10 states that receive refugees coming to America. From 1993 to 2000, approximately 3,000 Bosnian refugees resettled in Massachusetts, particularly in the greater Boston area (Massachusetts Department of Public Health, 1995, 2000).

In addition to the exposure of wartime atrocities, refugees face additional postmigration stressors, including marginalization, socioeconomic disadvantage, acculturation difficulties, and loss of social support (Martin, 1994; Porter & Haslam, 2005). These stressors were particularly salient for Bosnians who came from an agrarian society and who, upon arrival in Massachusetts, were resettled in a densely populated, relatively poor suburb of greater Boston. Moreover, research indicates that refugees have better outcomes postresettlement when the conflict that displaced them was resolved (Porter & Haslam). For Bosnians, several of the individuals responsible for carrying out the ethnic cleansing still today remain at large; as well, their economy remains poor, reducing the feasibility of returning to their home country. These factors collectively place the Bosnian community at risk for adjustment problems.

Recent studies reveal that the psychiatric morbidity associated with mass violence in civilian and refugee populations is elevated when compared with nontraumatized communities (Mollica et al., 1999). Extensive studies among Indochinese refugees provide strong evidence to support this association. For example, Kinzie, Fredrickson, Ben, Fleck, and Karls (1984) diagnosed PTSD among 13 Cambodian concentration camp survivors in the first study using the criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) in a refugee population. More recently, in a sample of survivors of war from Algeria, Cambodia, Ethiopia, and Gaza, de Jong et al. (2001) found PTSD prevalence rates ranging from 15.8% to 37.4% among the four populations, indicating that war-related PTSD is common among refugee populations across different continents, cultures, and languages. In addition, studies examining trauma-exposed Bosnian refugees reported elevated rates of psychological distress, including PTSD and de-

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pression (Weine et al., 1995, 1998). This research reflects the presence of PTSD as one outcome of exposure to traumatic events in Western as well as non-Western cultures.

Today, methods for understanding and assessing the clinical presentation of psychological trauma in Westernized societies are well established. However, the assessment of trauma exposure and PTSD cross-culturally remains a goal that has not yet been not fully achieved. Relatively little information is available on the psychometric properties of assessment instruments utilized with culturally diverse populations, which in turn may adversely affect the accuracy of clinical and research diagnoses (Keyes, 2000). Our goal in the present study was to examine the psychometric characteristics of one commonly used instrument for assessing PTSD: the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995). Currently, the CAPS is the gold standard for PTSD research and clinical studies; it has been translated into approximately 10 languages (Weathers, Keane, & Davidson, 2001). However, to the best of our knowledge, only two published studies have validated a translated version of the CAPS (Paunovíc & Öst, 2005; Schnyder & Moergeli, 2002). For example, Paunovíc and Öst recently examined the psychometric properties of the Swedish translation of the CAPS in a sample of crime victims and refugees; results indicated good internal consistency as well as convergent validity with this translation. Although the CAPS has strong clinical and research utility in the assessment and diagnosis of PTSD in English, the limited research on the psychometric utility of translated versions precludes our ability to draw trenchant conclusions on the instrument's reliability and validity in other languages and cultures.

In response to the need for good psychometric science for use in refugee studies, we propose in the present study to analyze the psychometric properties of the CAPS—Bosnian translation. We used exploratory factor analyses (EFAs) using the Comprehensive Exploratory Factor Analysis (CEFA 1.10; Browne, Cudeck, Tateneni, & Mels, 2002) statistical program to examine the CAPS' factor structure for two-, three-, and four-factor models of PTSD. The rationale for the use of these models is based on previous factor analytic studies of PTSD. The two-factor solution is based on Buckley, Blanchard, and Hickling's (1998) model of PTSD as assessed by the CAPS (Blake et al., 1997). These two factors, labeled as intrusion/avoidance and hyperarousal/numbing, were found to appropriately reflect current theoretical models of PTSD in a sample of motor vehicle accident survivors. This model was based on Taylor, Kuch, Koch, Crockett, and Passey's (1998) EFA of motor vehicle accident survivors and United Nations peacekeepers exposed to wartime atrocities in Bosnia.

The three-factor solution is based on the research of McFall, Smith, Mackay, and Tarver (1990), who examined the factor structure of the Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988) in a sample of Vietnam combat veterans with PTSD. Their three factors reflect the latent constructs of intrusion, numbing, and arousal, which are parallel to the diagnostic criteria in the 4th edition of the *DSM* (*DSM–IV*; (American Psychiatric Association, 1994).

The four-factor solution is based on the research of King, Leskin, King, and Weathers (1998). This model includes the factors of reexperiencing, effortful avoidance, emotional numbing, and hyperarousal as assessed by the CAPS (Blake et al., 1990) in a sample of treatment-seeking male military veterans. These factors were found to be moderately to highly intercorrelated while still reflecting separate symptom dimensions that represent PTSD. Furthermore, Asmundson, Stapleton, and Taylor (2004), in their review of factor analytic studies of PTSD, concluded that, regardless of the dimensional model, avoidance and numbing appear to be distinct PTSD symptom clusters.

In addition, we examined several complementary parameters of the CAPS—Bosnian translation, particularly focusing on measures of reliability and validity. We hypothesized that the CAPS—Bosnian translation will be a reliable and valid instrument for assessing PTSD in a Bosnian refugee sample. Also, the factor structure of the CAPS—Bosnian translation will reflect current models of the factor structure of PTSD. Although the CAPS is frequently used across cultures, to date, no research study examined the psychometric properties of the CAPS in a refugee population residing in the United States. Especially with respect to the diagnosis of PTSD, studies that investigate the psychometric analyses of commonly used assessment instruments are critical.

## Method

### *Participants*

Participants were 115 Bosnian refugees resettled in the greater Boston area. Bosnians are Slavic people coming from an agrarian economy. Although Bosnians are European, they are distinct from other countries on the basis of their religion, with a large proportion of the population being Muslim. Religious affiliation of this sample included 77% Muslim, 10% Catholic, 4% Orthodox, and 8% no allegiance. Females constituted 67% of this refugee sample; as well, 98% of the sample reported exposure to at least one traumatic event during the war in Bosnia (see Table 1). The mean age of the sample was 46.0 years ($SD = 13.78$; range = 18–75). Marital status included 66% married, 11% single, 15% widowed, and 8% divorced. Participants' employment status was as follows: 51% employed, 28% unemployed, 11% retired, and 10% other.

We recruited participants through personal contacts, newspaper advertisements, and flyers distributed throughout the local Bosnian community. The advertisements publicized the availability of a psychological treatment study for Bosnian refugees suffering from the effects of the Balkans' civil war. The mental health evaluators for this project were Bosnian, allowing them the ability to recruit participants through their association with the community. All participants signed an Institutional Review Board-approved informed consent form once they agreed to participate.

### *Measures*

All measures were translated into Bosnian and then back-translated using a panel of three native Bosnian speakers who were fluent in English. First, all measures were translated into Bosnian by one native speaker. A second native speaker back-translated all measures. The third native speaker then confirmed the accuracy of both the translations and back-translations. Throughout the translation/back-translation process, Terence M. Keane was available to the panel for consultation. Back-translation is used to establish semantic equivalence with the original instrument (Keane, Kaloupek, & Weathers, 1996). One-way translations do not guarantee the semantic equivalence across the languages, less-

Table 1
*Demographic Information of Bosnian Refugee Participants*

| Variable | Participants with PTSD ($n$ = 56) | Participants without PTSD ($n$ = 59) | All participants ($n$ = 115) |
|---|---|---|---|
| Mean age (in years) | 52 | 39 | 46 |
| Gender (%) | | | |
| Male | 29 | 37 | 33 |
| Female | 71 | 63 | 67 |
| Religion (%) | | | |
| Muslim | 87 | 68 | 77 |
| Catholic | 7 | 12 | 10 |
| Orthodox | 4 | 5 | 4 |
| No allegiance | 2 | 13 | 8 |
| Other | 0 | 2 | 1 |
| Marital status (%) | | | |
| Married | 63 | 68 | 66 |
| Single | 7 | 15 | 11 |
| Widowed | 23 | 7 | 15 |
| Divorced | 4 | 10 | 8 |
| Education (%) | | | |
| None | 9 | 2 | 6 |
| Literate | 9 | 3 | 6 |
| Primary | 23 | 12 | 18 |
| Secondary | 30 | 48 | 54 |
| High school | 11 | 20 | 16 |
| University | 9 | 12 | 11 |
| Graduate | 4 | 0 | 2 |
| Employment status (%) | | | |
| Employed | 36 | 64 | 51 |
| Unemployed | 38 | 19 | 28 |
| Retired | 18 | 5 | 11 |
| Other | 8 | 12 | 10 |

*Note.* PTSD = posttraumatic stress disorder.

ening the ability to comparably measure the construct under investigation in the two cultures. The ultimate objective of semantic equivalence is to have the meaning of a statement be the same across the two languages.

*CAPS.* The CAPS is a structured diagnostic interview for PTSD that assesses the 17 core *DSM–IV* symptoms of the disorder, as well as the 8 associated features. (For the purposes of the present study, we analyzed only the 17 core symptom items.) Psychometric studies examining the CAPS demonstrate strong reliability and validity (Weathers et al., 2001). Kappa coefficients in previous studies ranged from .85 to .87 for the three primary symptom clusters, with a coefficient of .94 reported for the whole measure (Blake, 1994). The CAPS demonstrated strong convergent validity with the Mississippi Scale (.70; Keane, Caddell, & Taylor, 1988) and the PK scale (.84; Keane, Malloy, & Fairbank, 1984) of the Minnesota Multiphasic Personality Inventory—2 (MMPI–2; Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989).

*Structured Clinical Interview for DSM–IV (SCID; First, Spitzer, Gibbon, & Williams, 1996).* The SCID is a semistructured diagnostic interview designed to reliably assess and screen for psychiatric diagnoses. This research study used the depression, panic disorder, as well as psychotic screen modules of the SCID. Kappa coefficients on the depression and panic disorder SCID modules were .80 and .65, respectively (Zanarini et al., 2000). Information on the reliability of the psychotic screen module was not available.

*Semistructured Interview for Survivors of War (SISOW; Basoglu et al., 1994).* The SISOW—more specifically, the Exposure to Trauma Scale and the Exposure to Torture Scale—quantifies levels of exposure to trauma and torture in the Bosnian population. These two scales yield two objective measures: the number of types of trauma and torture to which an individual is exposed and total number of exposures to all forms of trauma and torture. In addition, two subjective measures are generated: the sum of perceived distress ratings with respect to each reported trauma and torture event and a global rating of overall stressfulness of trauma and torture. The psychometric utility of the SISOW in a Bosnian refugee population has not yet been demonstrated, yet its authors have communicated that a psychometric analysis will soon be completed (M. Livanou, personal communication, April 2005).

*Beck Depression Inventory—II (BDI–II; Beck, Brown, & Steer, 1996).* The BDI–II is a 21-item self-report instrument used to measure the severity of depression in adults and adolescents. Each of the 21 symptoms is represented by four statements reflecting increasing levels of severity, and each item is rated from 0 to 3. The BDI possesses strong reliability and validity across diverse clinical samples. Additionally, the BDI has been translated into approximately 30 different languages (Beck & Steer, 1987).

*General Health Questionnaire (GHQ; Goldberg & Hillier, 1979).* The GHQ is a widely used screening instrument. It detects a range of psychological disorders, including anxiety and depression, and is a valid and reliable instrument when used cross-culturally. Results from cross-cultural studies indicate that the GHQ effectively measures distress in both developing countries and in culturally diverse populations (Goldberg et al., 1997).

## *Procedure*

Ninety-three participants completed the full assessment battery; the remaining 22 participants completed portions of the assessment battery. A 42-year-old female Bosnian mental health evaluator, with a medical degree from the University of Sarajevo School of Medicine, conducted all interviews in the Bosnian language. This evaluator was trained to criterion by an expert in the administration of all measures prior to the beginning of the study. Interviews took place within the community in places such as a local library or school, as well as at the participant's home.

For this project, we stored all data on a personal computer and used the SPSS for Windows software (SPSS for Windows, Version 11.0; Chicago, IL; SPSS Inc., 2001) and the CEFA statistical program for all statistical analyses (Browne et al., 2002).

## *Data Analyses*

For each of the 17 symptoms of PTSD, we were interested in examining the fit of a two-, three-, and four-factor model of PTSD. Using CEFA (Browne et al., 2002) on each of the PTSD item scores, we calculated a variety of indices of best fit. We selected CEFA for these analyses because it is a relatively new program for carrying out EFAs that incorporates rotation and standard errors of estimates. Generally, factor analysis describes the number of common underlying entities responsible for the observed correlations among items. These entities, or factors, are determined by the

communality, which is the proportion of variance that an item has in common with other items. A fundamental problem with EFA is that obtaining these communalities is dependent upon the number of factors extracted and the number of factors extracted is dependent upon the communality. This cyclical relationship results in the number of factors being bound up in the communality, where the communality is unknown because the number of factors is unknown. The CEFA program resolves this problem by allowing researchers to appropriately define factors by forcing the number of factors into the command syntax. As a result, the communality is obtained through a defined number of factors. This method is exploratory because, if the output is not strong, factors can then be added or deleted; the model can be modified to see how it affects the strength of the output. In addition, CEFA provides fit indices to examine model fit; this includes the root mean square error of approximation (RMSEA) and chi-square. Examining the chi-square differences across models analyzed provides information on the adequacy of each model. We were also able to conduct maximum Wishart likelihood (MWL) analyses for this EFA, as the CAPS provides continuous summed scores rather than categorical items.

On the basis of prior research on the factor structure of PTSD, two-, three-, and four-factor models were estimated by MWL and an oblique rotation (Buckley et al., 1998; King et al., 1998; McFall et al., 1990). The items identified by Buckley et al., McFall et al., and King et al. were forced onto the predefined factors. In this way, we were able to evaluate the derived conceptual model of PTSD. The individual item severity scores for each of the 17 symptoms of PTSD, as measured by the CAPS 0–8 scales, were calculated by adding the frequency and intensity for each individual item. These scores were used as observed indicators of the latent constructs of the two-factor (Intrusion/Avoidance and Hyperarousal/Numbing; Buckley et al., 1998), three-factor (Intrusion/Avoidance, Numbing, and Arousal; McFall et al.), and four-factor models of PTSD (Reexperiencing, Effortful Avoidance, Emotional Numbing, and Hyperarousal; King et al.) of PTSD.

Next, we calculated partial correlations, which determine effect sizes for the items and determine which factors are most important in predicting the items. We obtained the partial correlations by first dividing the loadings by the standard error to obtain the critical ratio (*t* statistic), which indicates approximately which items have significant loadings on each factor. A formula with the critical ratio was then used to calculate the partial correlation for each loading.

To evaluate the reliability and validity of the CAPS—Bosnian translation, we also conducted several multivariate analyses. To examine internal consistency, we used coefficient alpha first for the total CAPS and then for each of the symptom clusters. Next, we calculated individual item–total score bivariate correlations, another measure of internal consistency. To derive estimates of convergent and divergent validity, we used a point biserial correlational analysis between the dichotomous score of the CAPS and continuous measures in our assessment battery. These measures include modules from the SCID (First et al., 1996), the BDI–II (Beck et al., 1996), the GHQ (Goldberg & Hillier, 1979), and the SISOW (Basoglu et al., 1994). In addition, we correlated factor scores on the CAPS with these measures to assist in the interpretation of the factors.

## Results

### *Factor Analysis*

When conducting factor analyses on psychological test instruments, the larger the sample one has, the more stable the results are. However, conventions vary for the most appropriate number of participants per variable, but most agree that approximately 5 to 10 participants per variable render stable factors. Because of our modest sample size of 115 participants (approaching 7 participants per variable), overestimation might be expected of the RMSEA. As a result, we placed less emphasis on this index in the output of the EFA (Rodebaugh et al., 2004).

We observed considerable overlap in the 90% confidence intervals (CIs) for the three- and four-factor solutions, indicating a less stable solution for these models. The two-factor solution evidenced less CI overlap and, in turn, a more stable solution. As well, emphasis was placed on the partial correlations that suggested that the two-factor solution could be meaningfully interpreted. The three-factor solution generated some meaningful interpretations; however, due to the instability of the solution, drawing more conclusive results is difficult. As well, the four-factor solution did not demonstrate strong conceptual or statistical support and, we felt, did not appropriately characterize the data. As a result of strong statistical and conceptual support, the two-factor model demonstrated the most appropriate fit for this sample when compared with the three-and four-factor models. Table 2, Table 3, and Table 4 present the partial correlations for the two-, three-, and four-factor models, respectively.

In the two-factor model (see also Figure 1), the first factor comprised items measuring the constructs of intrusion and avoidance. Items include intrusive recollections, avoidance of thoughts and people, hypervigilance, and exaggerated startle. The second factor consisted of items measuring symptoms of hyperarousal and numbing. This includes symptoms such as distressing dreams, detachment, difficulty sleeping, and difficulty concentrating.

Table 2
*Partial Correlations for Two-Factor Model*

| Symptom | Factor | |
|---|---|---|
| | Intrusion/ avoidance | Hyperarousal/ numbing |
| B1. Intrusive recollections | .55 | .20 |
| B2. Distressing dreams | .34 | **.36** |
| B3. Recurring event | .14 | **.44** |
| B4. Psychological distress | **.82** | .16 |
| B5. Physiological reactivity | **.78** | .01 |
| C1. Avoidance of thoughts, feelings | **.70** | .17 |
| C2. Avoidance of people, places | **.46** | .04 |
| C3. Inability to recall | .13 | .26 |
| C4. Diminished interest | .24 | **.31** |
| C5. Detachment | .12 | **.24** |
| C6. Restricted affect | .01 | **.52** |
| C7. Foreshortened future | .09 | **.59** |
| D1. Sleep difficulties | .19 | **.48** |
| D2. Irritability | **.33** | .07 |
| D3. Difficulty concentrating | .14 | **.50** |
| D4. Hypervigilance | **.34** | .06 |
| D5. Exaggerated startle | **.53** | .02 |

Table 3
*Partial Correlations for Three-Factor Model*

| Symptom | Factor | | |
|---|---|---|---|
| | Intrusion | Numbing | Arousal |
| B1. Intrusive recollections | **.65** | .10 | .09 |
| B2. Distressing dreams | **.53** | .22 | .00 |
| B3. Recurring event | **.49** | .22 | .31 |
| B4. Psychological distress | .53 | .001 | **.58** |
| B5. Physiological reactivity | **.63** | .00 | .42 |
| C1. Avoidance of thoughts, feelings | **.59** | .20 | .40 |
| C2. Avoidance of people, places | **.53** | .29 | .11 |
| C3. Inability to recall | .06 | **.20** | .10 |
| C4. Diminished interest | .07 | **.37** | .26 |
| C5. Detachment | .17 | **.33** | .30 |
| C6. Restricted affect | .06 | **.56** | .06 |
| C7. Foreshortened future | .28 | **.55** | .08 |
| D1. Sleep difficulties | .38 | **.46** | .01 |
| D2. Irritability | .05 | .22 | **.27** |
| D3. Difficulty concentrating | .06 | **.63** | .13 |
| D4. Hypervigilance | .10 | .05 | **.30** |
| D5. Exaggerated startle | .24 | .13 | **.41** |

In the three-factor model, the first factor contained items measuring symptoms of intrusion and avoidance. This includes intrusive recollections, psychological distress, and avoidance of thoughts and people. The second factor consisted of items measuring numbing to include detachment, decreased interest, difficulty sleeping, and difficulty concentrating. The third factor represented items measuring symptoms of arousal such as anger, hypervigilance, and exaggerated startle.

The four-factor model did not appropriately characterize the data; these factor loadings did not reflect any existing statistical model for a four-factor solution of PTSD. We considered this a possible function of sample size and a high number of parameter estimates (79; D. W. King, personal communication, October 2004).

Table 4
*Partial Correlations for Four-Factor Model*

| Symptom | Factor | | | |
|---|---|---|---|---|
| | Intrusion | Avoidance | Numbing | Arousal |
| B1. Intrusive recollections | **.45** | .22 | .14 | .12 |
| B2. Distressing dreams | **.40** | .38 | .06 | .12 |
| B3. Recurring event | .33 | .13 | .32 | **.36** |
| B4. Psychological distress | .23 | **.65** | .01 | .35 |
| B5. Physiological reactivity | .38 | **.41** | .04 | .34 |
| C1. Avoidance of thoughts, feelings | .38 | **.43** | .33 | .34 |
| C2. Avoidance of people, places | **.51** | .12 | .10 | .12 |
| C3. Inability to recall | .12 | .07 | **.24** | .12 |
| C4. Diminished interest | .04 | .20 | **.41** | .27 |
| C5. Detachment | **.04** | .10 | .22 | **.45** |
| C6. Restricted affect | .10 | .07 | **.59** | .12 |
| C7. Foreshortened future | .33 | .04 | **.58** | .04 |
| D1. Sleep difficulties | **.45** | .06 | .43 | .17 |
| D2. Irritability | .04 | .07 | .12 | **.45** |
| D3. Difficulty concentrating | .02 | .04 | **.65** | .21 |
| D4. Hypervigilance | .13 | .06 | .04 | **.68** |
| D5. Exaggerated startle | .27 | .23 | .05 | **.41** |

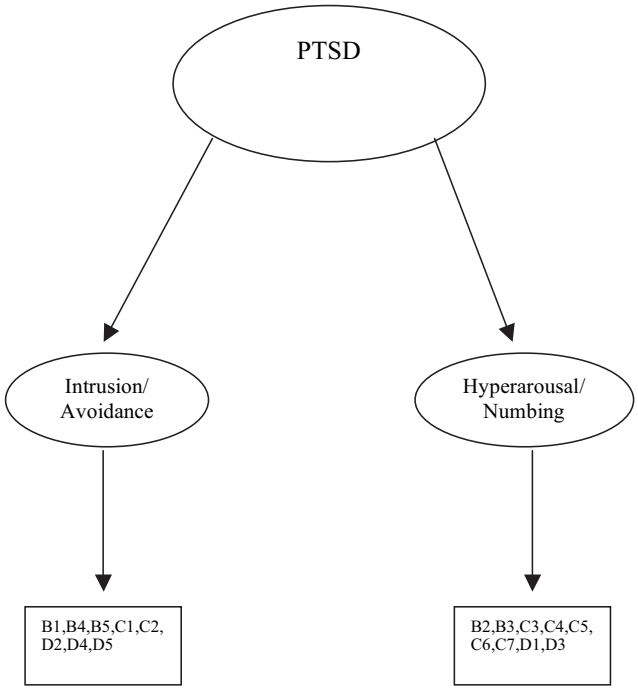


*Figure 1.* Factor structure for two-factor model.

### *Coefficient Alpha and Item–Total Score Correlations*

An examination of the coefficient alpha statistics revealed a coefficient alpha of .92 for the 17-item CAPS. For the item–total score correlations, the average was .66 ($p < .01$), with a range of .26–.83 (all $p$s $< .01$). All correlations exceeded .45, with the exception of the amnesia variable (.26). Weak loadings and correlations of items reflecting memory difficulty across measures of PTSD are documented in similar factor analytic studies (King et al., 1998). The two-factor model demonstrated coefficient alphas for the Intrusion/Avoidance and Hyperarousal/Numbing of .88 and .85, respectively.

### *Convergent and Divergent Validity*

To estimate convergent validity, we utilized a point biserial correlational analysis of the CAPS dichotomous score with the other measures; Factor 1 with the remaining measures; and finally with Factor 2 and these measures. Table 5 presents the correlation coefficients between the measures, the CAPS dimensional score, and the two factor-derived dimensions. The CAPS dimensional score, as well as Factors 1 and 2 of the two-factor model, evidenced strong convergent validity with instruments measuring depression, anxiety, and levels of psychosocial functioning. For example, the correlation coefficients for the CAPS dimensional score, as well as the two-factor scores, with the BDI–II were .65, .44, and .57, respectively. In addition, the correlation coefficients for the three scores with the panic disorder module of the SCID were .43, .33, and .32, respectively. These are strong correlations,

Table 5
*Correlation Coefficients Between CAPS and Related Measures*

| Measure | CAPS total | CAPS two-factor model | |
|---|---|---|---|
| | | Intrus/avoid | Hyper/numb |
| Depression | | | |
| BDI total | .65** | .44** | .57** |
| SCID—lifetime | .50** | .40** | .35** |
| Anxiety | | | |
| Panic | .43** | .33** | .32** |
| Psychosis | .20* | .14 | .17 |
| Psychosocial functioning | | | |
| GHQ | .60** | .38** | .57** |
| Trauma exposure | | | |
| SISOW | .20* | .07 | .20* |

*Note.* CAPS = Clinician-Administered PTSD Scale; Intrus/avoid = intrusion/avoidance; Hyper/numb = hyperarousal/numbing; BDI = Beck Depression Inventory; SCID = Structured Clinical Inventory for the *DSM-IV;* GHQ = General Health Questionnaire; SISOW = Semistructured Interview for Survivors of War.
* $p < .05$. ** $p < .01$.

given that the panic disorder module produces only a dichotomous outcome variable. To arrive at an estimate of divergent validity, we examined the correlation between the total CAPS score, Factor 1 and Factor 2 with the psychotic module of the SCID. Of note, the prevalence rate of psychosis within this refugee sample was 8%, a rate high enough to permit an examination of these interrelationships. As expected, we observed low intercorrelations: .20, .15, and .17. This indicates that the CAPS did not correlate with a theoretically unrelated measure of psychopathology.

## Discussion

Refugees from war-torn countries are often exposed to atrocities such as torture, deprivation, and death. As refugees continue to resettle in the United States following war, the demand to effectively assess and treat these individuals continues to grow. Understanding the psychometric properties of the assessment instruments used will yield better diagnosis and contribute to improved treatment services for these individuals.

The present study provides empirical evidence for the utility of the CAPS—Bosnian translation in assessing the symptoms of PTSD in an adult Bosnian refugee sample. The CAPS total score, as well as the individual factor scores, evidenced strong reliability and validity, indicating that PTSD can be accurately assessed within this refugee cohort using the CAPS. This study provides further evidence for the ability of the CAPS to appropriately assess PTSD across cultures, languages, and refugee populations; however, additional psychometric research is needed with the CAPS in other refugee populations.

In addition, CEFA, a new approach to exploratory factor analysis, indicated that the CAPS accurately measured two dimensions of PTSD reflecting symptoms of intrusion/avoidance and hyperarousal/numbing. The factors derived from this study are similar to the two-factor models described by Taylor et al. (1998) and Buckley et al. (1998). However, variations existed among the variable loadings across these two-factor models. For example, in Buckley et al.'s model, the variable measuring irritability or outbursts of anger loaded on the hyperarousal and numbing factor, whereas this variable loaded onto the intrusion and avoidance factor in this refugee sample. Conceptually, the irritability/anger variable can be understood as an avoidant strategy, as well as an arousal strategy, where anger avoids feeling weak or helpless. Anger can also be conceptualized as occurring in response to intrusive symptoms including intrusive recollections and psychological distress. Our findings also provide support for Asmundson et al.'s (2004) findings distinguishing between the avoidance and numbing PTSD symptom clusters, which suggests the need for a revision of the current diagnostic criteria.

In addition, the factors derived from this study are distinct from McFall et al.'s (1990) three-factor model and King et al.'s (1998) four-factor model of PTSD. Although the three-factor model is similar to McFall et al.'s findings, the significant CI overlap weakens the strength of our findings, making it difficult to draw meaningful conclusions. As well, the four-factor solution did not reflect any existing four-factor model of PTSD. These differences within the two-factor models and the three- and four-factor models could be indicative of cultural differences among the populations being examined, as well as differences in the type of traumas experienced, sample size, or perhaps even linguistic differences.

There are several limitations to this psychometric analysis of the CAPS—Bosnian translation. First, this study included a modest sample size averaging approximately 7 participants per variable, limiting the analyses for the three- and four-factor models. For example, the CI for the three- and four-factor solutions had a significant amount of overlap for the variables across the factors. In addition, the solution for the four-factor model did not fit any existing theoretical model on the latent constructs of PTSD. A second limitation of this study was that the sample consisted exclusively of help-seeking Bosnian refugees. As a result, participants may not be representative of the general population of Bosnian refugees or of the general population of refugees resettled in Massachusetts or the United States. Third, only one measure of PTSD was used to evaluate the presence of PTSD in this population. Although the CAPS is the most commonly used assessment tool for PTSD, other measures of PTSD, including the PTSD Checklist (Weathers, Litz, Herman, Huska, & Keane, 1993) and the Mississippi Scale for Combat-Related PTSD (Keane et al., 1988) could be utilized in conjunction with the CAPS in cross-cultural research to ensure an accurate diagnosis of PTSD. A fourth limitation was that this study only focused on the psychometric properties of a measure that examined one psychological disorder, although research indicates that other disorders such as depression are frequently diagnosed in various refugee populations (Weine et al., 1995, 1998). Finally, there are general limits to cross-cultural studies in that psychometric adequacy does not necessarily equal cultural validity. Psychological responses to trauma in cross-cultural populations may go well beyond the *DSM–IV* criteria established for Western populations and include responses specific to that culture. As a result, validity studies in these populations are warranted and needed.

Despite the aforementioned limitations, this study evidenced considerable strengths. We recruited 115 refugee participants from a single country. This number is significant when compared with other research studies within refugee populations (e.g., Weine et al., 1998). In addition, this study included a multitrait measurement of disorders including depression, anxiety, trauma exposure,

and health outcomes, allowing the researchers to examine levels of symptomatology beyond PTSD. The presence of these measures permitted an analysis of convergent and divergent validity in the present study. Finally, this study analyzed the factor structure using the CEFA statistical program (Browne et al., 2002), a new approach to EFA. The strength of this program is that it permits an examination of indices of fit for the factors derived while also permitting an examination of the forced extraction of factors in the command syntax.

The findings of this study raise several issues for further study. First, additional factor analyses should be conducted to replicate the present findings among other samples of Bosnian refugees, in general refugee samples, and in other trauma populations. Second, similar psychometric analyses on different measures of PTSD would be welcome additions to the literature on refugee trauma assessment. Third, this study provided simply the initial steps toward developing a psychometrically sound culturally sensitive measure. A more extensive analysis that would include a comprehensive utility analysis with information on sensitivity and specificity, a multitrait multimethod analysis, as well as construct validity is recommended.

The present findings address the need for additional studies of the psychometric properties of measures used in culturally diverse settings. This study indicates that survivors of the Bosnian civil war are expressing PTSD in a manner similar to that of trauma survivors in other cultures and in other settings. As a result, assessment instruments such as the CAPS are able to appropriately assess the existence of symptoms of PTSD within this population. The use of the CAPS to measure PTSD in cross-cultural research is supported.

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